HEAT EXCHANGE UNIT INCLUDING APPARATUS TO REMOVE CONDENSED WATER

Technical Field

The present invention relates to a heat exchange unit including an apparatus to remove condensed water, and more particularly, to a heat exchange unit including an apparatus to remove condensed water by allowing the condensed water gathered on a cooling fin part of the heat exchange unit to be evaporated to the air within the heat exchange unit itself.

Further, the present invention relates to a heat exchange unit having an apparatus to remove the condensed water, being integrally combined with the power supplying unit to supply electric current to peripheral units of a computer.

Background Art

Generally, computers, communication apparatuses and electric/electronic apparatuses are constructed with a variety of parts or components each having its own function and being electrically connected by wires or cables through a printed circuit board (PCB), wherein the aforementioned apparatuses are operated or controlled according to operation of the components thereof.

While the apparatuses are being operated or controlled by operation of the components, a large amount of heat would be generated from the components if they have been used for a long time.

The heat generated from the components causes the life span of the components to be shortened and also the performances thereof to be deteriorated. Further, the heat may affect other components adjacent to a heat generating component. In a worse case, the heat may be a cause of malfunction or impossibility of data processing of the apparatuses. Therefore, a cooling device to cool down the components has been used.

The cooling device to cool down the components is provided with a hot sink having internally a projected square heat isolating part and a heat discharging

fan discharging the drawn hot air to the outside.

The cooling device also comprises a cool sink having a cooling fan for supplying external air into the inside thereof to thereby generate cool air.

The cooling device is further provided a thermoelectric element disposed in the projected heat isolating part of the hot sink to transmit cool air of the cool sink, thereby cooling down the heat generated from the components of various electronic apparatuses.

For reference, the hot sink is formed with multiple heat generating fins combined with one another, and the cool sink is also formed with multiple cooling fins.

In the heat exchange unit, the cool air discharged toward discharging holes after passing through the cool sink causes condensed water to be generated due to the temperature difference from internal air.

Generation of the condensed water will be described in more detail. To describe, various electronic apparatuses are being used under the humidity of air, which would increase by 70% or more in the season of summer.

At this time, since the temperature of cooling fins of an air conditioner decreases lower than the Dew point of air, moisture in the air is condensed on the cooling fins, to thereby generate condensed water.

Dehumidifying temperature of the air is determined depending upon a relation of temperature and humidity. The temperature of cooling fins of the cooling device used to maintain the internal temperature of the apparatuses around 20℃ is actually lower than 10℃.

The condensed water generated due to the temperature difference is flown into control parts of the various electronic apparatuses, thereby causing electric shock and malfunction thereof.

Thus, to remove the condensed water formed on the cool sink, there is a need to separately provide a discharge hose for discharging the condensed water outside and a condensed water condensing part for collecting the condensed water discharged through the discharge hose, or otherwise, to internally provide a

condensed water condensing part for collecting the condensed water gathered on the cook sink.

However, if the condensed water is collected on the condensing part over the predetermined amount, the condensed water overflows and the overflowed water is flown into the control parts of the electronic apparatuses, thereby still causing electrical shock and malfunction thereof.

Also, since the power supplying unit and the heat exchange unit are respectively mounted within the computer, they need a larger space and a large number of parts to install them, thereby causing economic loss.

As a consequence, there is a need to provide separate discharging holes to discharge the heat generated within the power supplying unit and to install a separate power line to operate the heat exchange unit.

Disclosure of Invention

The present invention is conceived to solve the aforementioned problems. An object of the present invention is to provide a heat exchange unit including an apparatus to remove condensed water by allowing the condensed water gathered on a cool sink to be absorbed into a condensed water-evaporating means and the absorbed condensed water to be evaporated to the air by the hot air generated in a heat generating fin part of a hot sink.

Further, a power supplying unit to supply power to components and elements of a computer, a communication apparatus and an electric/electronic appliances is integrally combined with the heat exchange unit to cool down the heat from the components and elements of the computer, the communication apparatus and the electric/electronic appliances.

According to another object of the present invention, the inside of the power supplying unit is communicated with the heat discharging fan by a communicating tube, thereby allowing the heat generated in the power supplying unit to be discharged to the outside through the heat discharging fan.

To accomplish these and other objects, there is provided a heat exchange

unit having an apparatus to remove condensed water, comprising the heat exchange unit including a hot sink equipped with a heat discharging fan, a cool sink equipped with a cooling fan, and a thermoelectric element disposed between the hot sink and the cool sink, and a condensed water-evaporating means for absorbing the condensed water gathered on the cool sink provided within the heat exchange unit and evaporating the condensed water to the air by the heat from the hot sink.

According to the present invention, the heat exchange unit including an apparatus to remove the condensed water comprises a case having internally a horizontal partition in the middle thereof, and a cover covering the top of the case.

Preferably, the heat exchange unit comprises a hot sink having a power supplying unit over the internal partition of the case and a heat discharging fan below it, a cool sink equipped with a cooling fan and a thermoelectric element disposed between the hot sink and the cool sink.

The heat exchange unit is further provided with a condensed water-evaporating means to evaporate the condensed water to the air by the heat from the hot sink after absorbing the condensed water gathered on the cool sink.

Brief Description of Drawings

The above and other objects and features of the present invention will become apparent from the following description of preferred embodiments given in conjunction with the accompanying drawings, in which:

FIG. 1 is a block diagram illustrating the whole construction of a heat exchange unit including an apparatus to remove condensed water according to the present invention;

FIG. 2 is a perspective view of the heat exchange unit including an apparatus to remove the condensed water according to the present invention;

FIG. 3 is an exploded perspective view of the heat exchange unit including an apparatus to remove the condensed water according to the present invention;

FIG. 4 is a sectional view illustrating an installation of an absorbing part of a condensed water-evaporating means on a cooling fin part according to the present invention;

FIG. 5 is a sectional view illustrating an installation of an evaporating part of a condensed water-evaporating means on a heat generating fin part according to the present invention;

FIG. 6 is a block diagram illustrating a heat exchange unit including an apparatus to remove the condensed water according to another embodiment of the present invention;

FIG. 7 is a schematic diagram illustrating an evaporation process of condensed water in the heat exchange unit including an apparatus to remove the condensed water according to another embodiment of the present invention;

FIG. 8 is a perspective view of the heat exchange unit including an apparatus to remove the condensed water according to another embodiment of the present invention;

FIG. 9 is an exploded view of the heat exchange unit including an apparatus to remove the condensed water according to another embodiment of the present invention;

FIG. 10 is a sectional view illustrating the main construction of the assembled heat exchange unit including an apparatus to remove the condensed water according to another embodiment of the present invention;

FIG. 11 is a sectional view illustrating an installation of an absorbing part of the condensed water-evaporating means to the cooling fin part according to another embodiment of the present invention;

FIG. 12 is a sectional view showing an installation of an evaporating part of a condensed water-evaporating means on a heat generating fin part according to another embodiment of the present invention;

FIG. 13 is a perspective view illustrating the cooling fin part of the cool sink, being formed with annular pipes, according to another embodiment of the present invention;

FIG. 14 is a perspective view illustrating the cooling fin part of the cool sink, being wound with wires, according to another embodiment of the present invention;

FIG. 15 is a sectional view taken along the line of A-A of FIG. 14;

FIG. 16 is a perspective view illustrating the cooling fin part of the cool sink, being combined with a partition, according to another embodiment of the present invention;

FIG. 17 is a sectional view taken along the line of B-B of FIG. 16;

FIG. 18 is an exploded perspective view illustrating a heat isolating spacer and a heat insulating member according to another embodiment of the present invention;

FIG. 19 is a sectional view illustrating a coupling status of the heat isolating spacer and the heat insulating member of FIG. 18; and

FIG. 20 is a sectional view illustrating an insulating member provided according to another embodiment of the present invention.

Best Mode for Carrying Out the Invention

Hereinafter, exemplary best modes of a heat exchange unit including an apparatus to remove condensed water, to carry out the present invention, will be described in detail with reference to the accompanying drawings.

FIG. 1 is a block diagram illustrating the whole construction of a heat exchange unit including an apparatus to remove condensed water according to the present invention, FIG. 2 is a perspective view of the heat exchange unit including an apparatus to remove the condensed water according to the present invention, FIG. 3 is an exploded perspective view of the heat exchange unit including an apparatus to remove the condensed water according to the present invention, FIG. 4 is a sectional view illustrating an installation of an absorbing part of a condensed water-evaporating means on a cooling fin part according to the present invention, and FIG. 5 is a sectional view illustrating an installation of an evaporating part of a condensed water-evaporating means on a heat generating fin part according to the present invention.

Referring to FIGs. 1 through 5, the heat exchange unit 1 according to the present invention comprises a hot sink 10 having internally a projected square heat isolating part 16 and a heat discharging fan 14 for discharging internal air to the

outside, and a cool sink 20 having a cooling fan 24 for drawing external air and supplying the drawn air to the inside thereof.

A thermoelectric element 26 is seated on the projected heat isolating part 16 of the hot sink so as to transmit cooled air to the cool sink 20.

The hot sink 10 and the cool sink 20 are fixed by a plurality of fixing means, and comprises respective cases 2 accommodating therein the cool sink 20 and the hot sink 10 and covers 3 covering the top parts of the cases 2.

A condensed water-evaporating means 30 comprises an absorbing part 32 disposed below a condensed water condensing part 28 of the cooling fin part 22 on which the condensed water is collected, and an evaporating part 36 disposed below the hot sink 10 toward the discharging part 18 through which internal hot air is discharged outside.

A connection part for connecting the absorbing part 32 and the evaporating part 36 is provided, to thereby allow the condensed water absorbed through the absorbing part 32 to be transmitted to the evaporating part 36.

A seating part 40 is positioned on the bottom of the condensed water-evaporating means 30 so as to prevent the condensed water absorbed from being flown into the inside of the heat exchange unit 1.

To sense generation of the condensed water and facilitate evaporation of the condensed water, a structure to detect existence or non-existence of the condensed water and evaporate the condensed water according to the detection result is provided between the condensed water-evaporating means 30 and the seating part 40.

To specify, a condensed water sensor 52 for detecting existence or non-existence of the condensed water is disposed on the bottom of the absorbing part 32 of the condensed water-evaporating means 30 and a temperature sensor 50 for detecting a temperature of the condensed water-evaporating means(?) to maintain it in a constant manner is disposed on the bottom of the evaporating part 36.

Observing the heat exchange unit according to the present invention, if external air is drawn into the cool sink 20 by the cooling fan 24, the drawn air is cooled down while passing through the cooling fin part 22 provided in the cool sink

20.

The cooled air is supplied to the inside through a blowing duct 27, to thereby cool down the heat generated in components of various electronic apparatuses.

On the surface of the cooling fin part 22 on which the cool air supplied inwardly through the blowing duct 27 while passing through the cool sink 20 meets internal air is generated condensed water because of a temperature difference between them.

The condensed water generated so is absorbed into the absorbing part 32 below the condensed water-evaporating means 30 and moved into the evaporating part 36 of the condensed water-evaporating means 30 provided below the hot sink 10, through the connection part 34.

The condensed water absorbed into the condensed water-evaporating means 30 is prevented from being drawn into the inside of the heat exchange unit 1 since the condensed water-evaporating means 30 is securely seated on the seating part 40.

At this time, the heat generated by operation of a thermoelectric element 26 is transmitted to the hot sink 10, and the heat of the hot sink 10 heats the condensed water absorbed into the evaporating part 36 of the condensed water-evaporating means 30 to increase the temperature of 35℃ or more; on this temperature, the condensed water is well apt to be evaporated.

The condensed water heated in the evaporating part 36 of the condensed water-evaporating means 30 is evaporated to the outside through the discharging part 18. At this time, the temperature of the hot sink 10 is in the range of about 40℃ to 50℃ or more, and the temperature of the air discharged is in the range of about 35℃ to 40℃.

The condensed water absorbed in the absorbing part 32 of the condensed water-evaporating means 30 is moved into the evaporating part 36 through the connection part 34 and the condensed water moved into the evaporating part 36 is evaporated to the outside through the discharging part 18 by the heat of a heat generating fin part 12.

As the condensed water is evaporated in the evaporating part 36, the condensed water absorbed into the absorbing part 32 is consecutively supplied to the evaporating part 36 through the connection part 34.

To facilitate evaporation of the condensed water in the evaporating part 36 of the condensed water-evaporating means 30, a heater 60 to heat the condensed water to a predetermined temperature is provided so that the condensed water is evaporated in a fast manner.

At this time, the temperature sensor 50 provided in the evaporating part 36 of the condensed water-evaporating means 30 detects the temperature of the heater 60 so that it is maintained at the temperature not harmful to humans, for example, below 60℃.

The detected temperature information is transmitted to the control part 70 so that the temperature of the heater 50 is controlled and maintained below 60℃ according to control by the control part 70.

The control part 70 detects existence or non-existence of the condensed water in the absorbing part 32 through a condensed water sensor 52 provided in the absorbing part 36 of the condensed water-evaporating means 30.

Information on existence or non-existence of the condensed water as sensed is transmitted to the control part 70. Where it is determined that there is no condensed water, the control part 70 interrupts power supply by the power supplying unit 72 to thereby interrupt operation of the heater 60.

The condensed water-evaporating means 30 is preferably made of capillary fiber having better performance in absorption and evaporation.

For reference, the capillary fiber currently in use is comprised of super infinitesimal fiber below 1/100㎜ in thickness. It has been known that this kind of finely processed fiber has a water absorbing ability of three times or more higher than common fibers have.

FIG. 6 is a block diagram illustrating a heat exchange unit including an apparatus to remove the condensed water according to another embodiment of the present invention, FIG. 7 is a schematic diagram illustrating an evaporation process

of condensed water in the heat exchange unit including an apparatus to remove the condensed water according to another embodiment of the present invention, FIG. 8 is a perspective view of the heat exchange unit including an apparatus to remove the condensed water according to another embodiment of the present invention, FIG. 9 is an exploded view of the heat exchange unit including an apparatus to remove the condensed water according to another embodiment of the present invention, FIG. 10 is a sectional view illustrating the main construction of the assembled heat exchange unit including an apparatus to remove the condensed water according to another embodiment of the present invention, FIG. 11 is a sectional view illustrating an installation of an absorbing part of the condensed water-evaporating means to the cooling fin part according to another embodiment of the present invention, and FIG. 12 is a sectional view showing an installation of an evaporating part of a condensed water-evaporating means on a heat generating fin part according to another embodiment of the present invention.

As illustrated in FIGs. 6 through 12, the heat exchange unit according to the present invention comprises a case 101 having a partition 107 in a horizontal direction internally installed in the middle thereof, and a cover 102 covering the top of the case 101.

On the top of the internal partition 107 of the case 101 is formed a power supplying unit 105 having a power connecting inlet 106 into which an external power line is inserted, through which the power is supplied.

According to the present invention, there is provided the heat exchange unit 110 comprising a hot sink 111 equipped with a heat discharging fan 114 below the partition 107, a cool sink equipped with a cooling fan 124, and a thermoelectric element 126 disposed between the hot sink 111 and the cool sink 121.

The power supplying unit 105 drives a computer and the heat exchange unit when the power supply line supplied externally is inserted into the power connecting inlet 106 and power is supplied to the power supplying unit 105.

At this time, the power supplied to the power supplying unit 105 is supplied respectively to a power part 172 and the thermoelectric element 126 of the heat

exchange unit 100, to thereby allow the heat exchange unit 110 to be operated.

To discharge the heat generated in the power supplying unit 105 to the discharging part 118, there is provided a communicating pipe 117 communicating the power supplying unit 105 with the heat discharging fan 114 of the heat exchange unit 110.

Respective heat insulating members 108, 108a and 108b are disposed between the middle of an internal partition 107 of the case 101 and the heat exchange unit 110 and an outside of the heat exchange unit 110, that is, an inside of the cover 102, in the heat exchange unit 110, on an external face thereof and on the bottom of the heat exchange unit 110, so as to prevent loss of heat from the heat exchange unit 110.

The heat exchange unit 110 has a projected square heat insulating part 116 inside the heat exchange unit, and is provided with a hot sink having a heat discharging fan 114 to discharge internal air to the outside.

The cool sink 121 having a cooling fan 124 draws external air and supplying the drawn air into the inside is further provided.

The thermoelectric element 126 to transmit cool air to the cool sink 121 is seated on the projected heat insulating part 116 of the hot sink 111.

The hot sink 111 and the cool sink 121 are fixed by use of multiple bolts 119, and an absorbing part 132 of the condensed water-evaporating means 130 is disposed below the condensed water condensing part 128 of the cooling fin part 122 on which the condensed water is gathered.

The condensed water evaporating part 136 is disposed below the condensed water-evaporating means 130 toward the discharging part 118 of the hot sink 111 to discharge internal hot air to the outside.

The heat exchange unit 110 is provided with a connection part 134 so as to allow the condensed water absorbed in the absorbing part 132 to be transmitted to the evaporating part 136.

The bolt 119 comprises a metallic bolt 140 as a fixing means, by which the hot sink 111 and the cook sink 121 are fixed to each other.

The heat exchange unit 110 is provided with a seating part 140 on the bottom of the condensed water-evaporating means 130 to prevent the condensed water absorbed from being flown around the inside of the heat exchange unit 110.

In order to sense generation of the condensed water and facilitate evaporation of the condensed water, there is provided a structure to detect existence or non-existence of the condensed water between the condensed water-evaporating means 130 and the seating part 140 and evaporate the condensed water according to a detection result.

In other words, a condensed water sensor 152 to detect existence or non-existence of the condensed water is disposed on the bottom of the absorbing part 132 of the condensed water-evaporating means 130, and a temperature sensor to sense a temperature is disposed on the bottom of the evaporating part 136 so as to maintain it under the predetermined temperature.

A control part 170 is provided, which receives information on existence or non-use of the condensed water from the condensed water sensor 152 to or not to operate the heater 160, and receives information from the temperature sensor 150 to prevent excessive increase of the predetermined temperature.

The control part 170 senses an internal temperature of a computer case and a temperature of a CPU discharging fan and determines a rotation speed of the cooling fan of the cool sink and operation or non-operation of the discharging part of the hot sink based on the sensed information.

Observing the heat exchange unit according to the present invention, if external air is drawn into the cool sink 121 by the cooling fan 124, the drawn air is cooled down while passing through the cooking fin part 122 provided in the cool sink 121.

The cooled air is supplied inwardly through a blowing duct 127, thereby cooling down the heat generated in components of various electronic appliances.

The cool air supplied inwardly through the blowing duct 127 after passing through the cool sink 121 generates condensed water due to the temperature difference from the internal air on the surface of the cooling fin part 122, the point of

which the cool air meets the internal air.

The generated condensed water is absorbed into the absorbing part 132 of the condensed water-evaporating means 130 and moved through the connection part 134 into the evaporating part 136 of the condensed water-evaporating means 130 provided below the hot sink 111.

Meanwhile, since the condensed water-evaporating means 130 is seated on the seating part 140, the condensed water absorbed into the condensed water-evaporating means 130 is blocked from being flown into the inside of the heat exchange unit 110.

At this time, the thermoelectric element 126 supplied power from the power supplying unit is operated, and thus, generated heat is transmitted into the hot sink 111.

Heat of the hot sink 111 serves to heat the temperature of the condensed water absorbed in the evaporating part 136 of the condensed water-evaporating means 130 to about 35℃ or more, the temperature of which better evaporation is made.

The condensed water heated in the evaporating part 136 of the condensed water-evaporating means 130 is evaporated to the outside through the discharging part 118.

At this time, the temperature of the hot sink 111 is in the range of about 40℃to 50℃ or more, and the temperature of the discharged air is in the range of about 35℃ to 40℃.

The condensed water absorbed into the absorbing part 132 of the condensed water-evaporating means 130 is moved to the evaporating part 136 through the connection part 134.

The condensed water moved into the evaporating part 136 is evaporated to the outside through the discharging part 118 by the heat of the heat generating fin part 112.

As the condensed water is evaporated in the evaporating part 136, the condensed water absorbed into the absorbing part 132 is consecutively supplied to

the evaporating part through the connection part 134.

To facilitate evaporation of the condensed water in the evaporating part 136 of the condensed water-evaporating means 130, a heater 160 is provided so as to heat the condensed water to a predetermined temperature and evaporate the condensed water in a fast manner.

To maintain the temperature of the heater 160 below 60℃, not harmful to human body, the temperature thereof is detected by the temperature sensor 150 provided in the evaporating part 136 of the condensed water-evaporating means 130.

The detected temperature information is transmitted to the control part 170 and, on this basis, the control part 170 controls the heater 160, the temperature of which is maintained below 65℃.

The control part 170 senses existence or non-existence of the condensed water in the absorbing part 132 through the condensed water sensor 152 provided in the absorbing part 136 of the condensed water-evaporating means 130.

Information on existence or non-existence of the condensed water as sensed is transmitted to the control part 170. Where it is determined that there is no existence of the condensed water, the control part 170 interrupts power supply to the power supplying part 172 so as to interrupt operation of the heater 160.

The condensed water-evaporating means 130 is preferably comprised of capillary fiber having an excellent performance in absorption and evaporation.

For reference, the capillary fiber currently in use is comprised of super infinitesimal fiber below 1/100㎜ in thickness(?). It has been known that this kind of finely processed fiber has a water absorbing ability of three times or more than common fibers have.

The heat generated by operation of the power supplying unit 105 is absorbed through the communicating pipe 117 by use of the absorbing ability of the heat discharging fan 116 and is discharged to the discharging part 118.

On the cover 102 covering the top of the case 101 is formed a plurality of passing holes 103 on the position of the power supplying unit 105.

By allowing a part of the heat generated in the power supplying unit 105 to

be discharged through the passing holes 103, when the heat is discharged through the discharging part 118 to the outside, the heat generated in the power supplying unit is discharged more smoothly.

FIG. 13 is a perspective view illustrating the cooling fin part of the cool sink, being formed with annular pipes, according to another embodiment of the present invention. As illustrated, the cooling fin part 122a of the cool sink 121a is formed with multiple annular pipes, making the condensed water gathered on the condensing part 128 of the cooling fin part 1221 smoothly drop to the absorbing part 132 of the condensed water-evaporating means 130.

FIGs. 13 and 14 shows the cooling fin parts of the cool sink being formed with annular pipes according to the present invention, engaged with wires. It is designed that the condensed water generated on the condensed water condensing part 128 of the cooling fin part 122a of the cool sink 121 drops to the absorbing part 132 according to the amount of the condensed water generated, that is, when the condensed water reaches a water drop of predetermined size.

Therefore, a multiplicity of wires 180 wound vertically are provided in the condensed water condensing part 128 on which the condensed water from the annular pipe-shaped cooling fin part 122a is collected.

This allows the condensed water to flow and drop to the absorbing part 132 along the wires 180 whenever generated, regardless of the amount of water drop gathered on the cooling fin part 122a, thereby preventing the condensed water from staying on the annular pipe-shaped cooling fin part 122a.

FIGs. 16 and 17 both illustrate partitions provided in the annular pipe-shaped cooling fin part of the cool sink according to the present invention. As illustrated, the plurality of partitions provided in the condensed water condensing part 128a of the cooling fin part 122a has the same effects as providing the wires 180 to the cooling fin part 122a.

As observed above in reference to the preferred embodiments of the present invention, there is no need to provide a separate discharging device to collect and remove the condensed water, thereby preventing electric shock and false operation

of the computer due to the condensed water.

FIGs. 18 and 19 both illustrate a heat insulating spacer 240 to block heat transmission between the hot sink 211 and the cool sink 221 according to another embodiment of the present invention.

The heat insulating spacer 240 is formed with a screw shaft 242 to be engaged into the hot sink 211, a screw hole 244 in opposition, into which the bolt 230 inserted into the cool sink is engaged, and securing holes 219 and 229 through which the heat insulating spacer 240 is secured onto the hot sink 211 and the cool sink 221.

The hot sink 211 and the cool sink 221 are not fixed by engaging the metallic bolt 230 as a fixing means to fix them each other directly into the hot sink 211, but the hot sink 211 and the cool sink 221 are fixed by connecting the heat insulating spacer 240 effective in heat insulation, with the middle of between them, thereby having an excellent heat insulation effect.

Also, loss from heat pumping of the thermoelectric element 226 by which the heat of the hot sink 211 is transmitted toward the cool sink 221 is prevented.

Where there is no heat insulating spacer 240 between the hot sink 211 and the cool sink 221, the metallic bolt 230 becomes to have the heat conductivity of 58.9~41.9[w/mk].

However, by providing the heat insulating spacer 240 to block heat transmission, the heat conductivity of the metallic bolt 230 is reduced to 2.09 to 1.57[w/mk].

Accordingly, the construction of the bolt 230 coupling the hot sink 211 and the cool sink 221 has a heat insulating effect of 29 times at maximum.

Since the projected heat insulating part 216 inside the hot sink onto which the thermoelectric element 226 is seated is projected, the space between the hot sink 211 and the cool sink 221 becomes widened, and thicker heat insulating member 240 can be disposed, thereby increasing the heat insulating effect.

Since the heat insulating member 250 is disposed in the space between the hot sink 211 and the cool sink 221, that is, on the circumference of the projected heat

insulating part 216, transmission of the heat generated in the hot sink 211 to the cool sink 221 is blocked.

FIG. 20 illustrates a heat insulating member according to another embodiment of the present invention. As illustrated, the heat insulating member 250a provided between the hot sink 211 and the cool sink 221 is of the same in thickness as the projected heat insulating part 219 of the hot sink 211.

Since a space between the hot sink 211 and the cool sink 221 as thick as the thermoelectric element 226 is separately formed, transmission of the heat generated in the hot sink 211 to the cool sink 221 is first interrupted by the heat insulating member 250a.

Then, the heat transmission is secondarily interrupted in the space between the hot sink 211 and the cool sink 221, thereby giving double heat insulating effect.

Industrial Applicability

As described above, since the condensed water is evaporated by the heat generated in the hot sink of the heat exchange unit according to the present invention, no energy to evaporate to the condensed water is separately needed, thereby increasing economical availability.

The condensed water is first evaporated by the heat generated in the heat generating part by the heater provided in the evaporating part of the condensed water evaporating part, and it is secondarily evaporated by the heat of the heater, thereby being capable of evaporating the condensed water to the external air rapidly.

Since the power supplying unit to be supplied power to drive the computer and then apply the power and the heat exchange unit are integrally combined, when this is mounted inside the computer, the space to be occupied thereby is reduced.

In addition, since a heat insulating spacer is provided between the hot sink and the cool sink, a metallic bolt engaged into the cool sink is blocked from directly contacting the hot sink, thereby reducing loss of heat.

Although the present invention has been described in connection with the preferred embodiments illustrated in the accompanying drawings, it should be

understood that the present invention is not limited thereto and those skilled in the art can make various modifications and changes without departing from the scope of the invention.